

# Installing and Configuring DHCP Server

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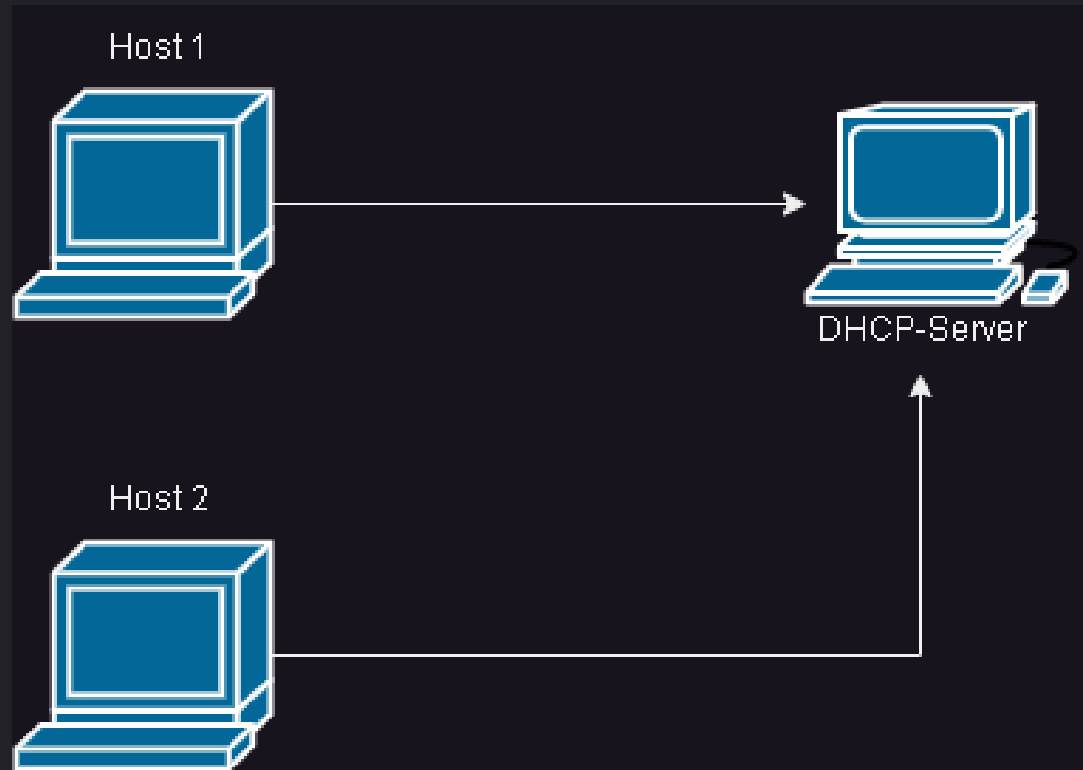
# Scope Of Work

**In this document we are going to simulate the installation / configuration and IP reservation of DHCP Server / Client**

Following tools were used in this workshop

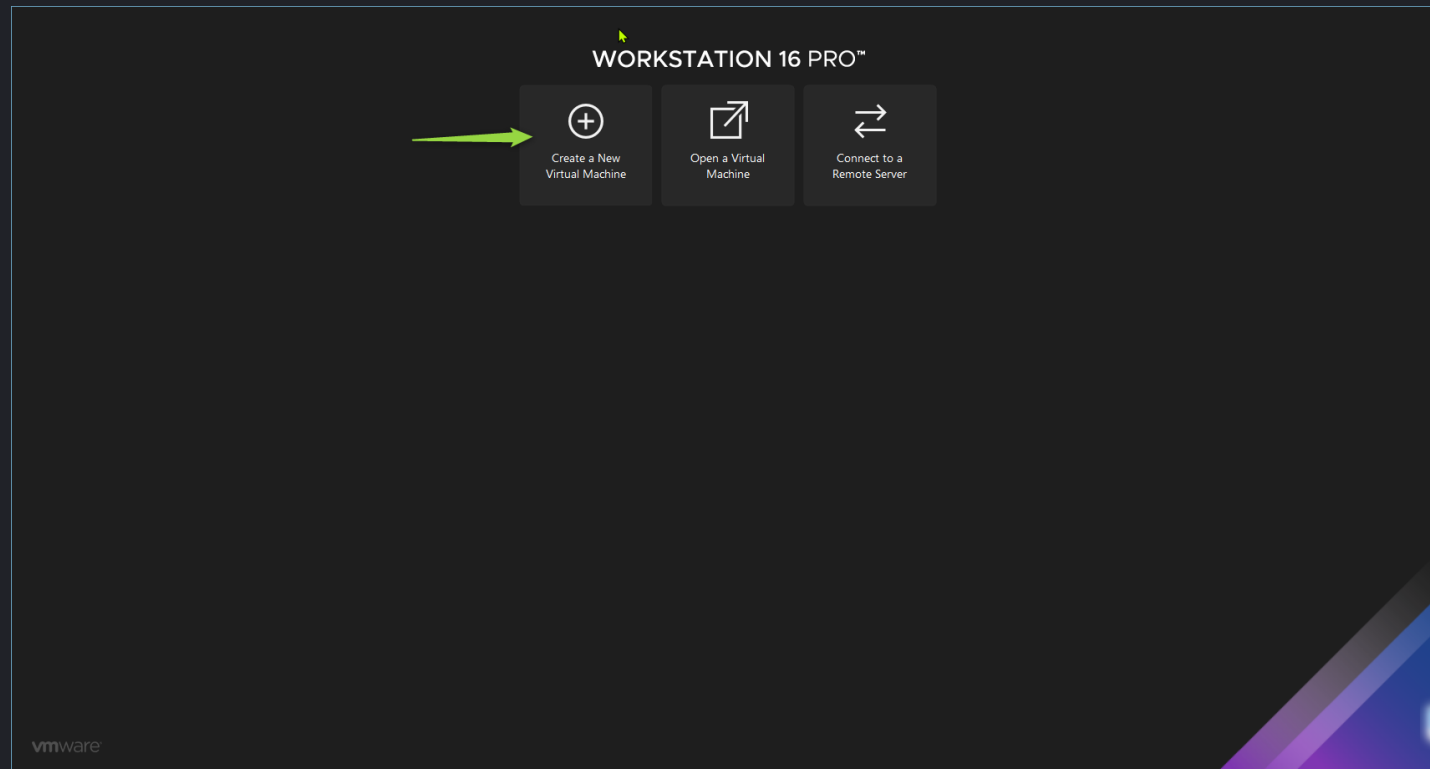
1. VMware Workstation (as hypervisor) on top of Windows 11.
2. Ubuntu Server (22.04) (DHCP Server)
3. Ubuntu Server (22.04) (Client server) Host1 and Host 2.

# Diagram For DHCP Lab

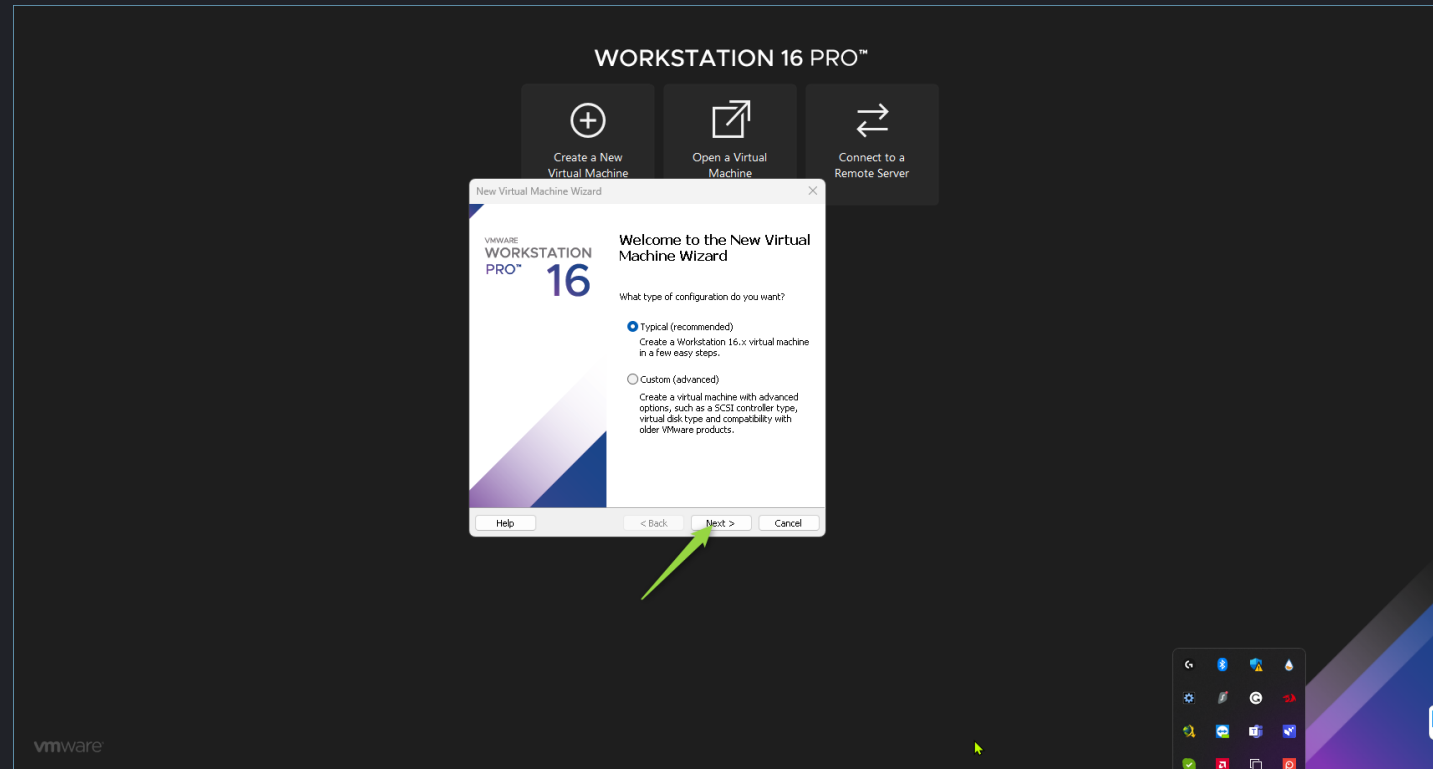


# Creating VM of Ubuntu

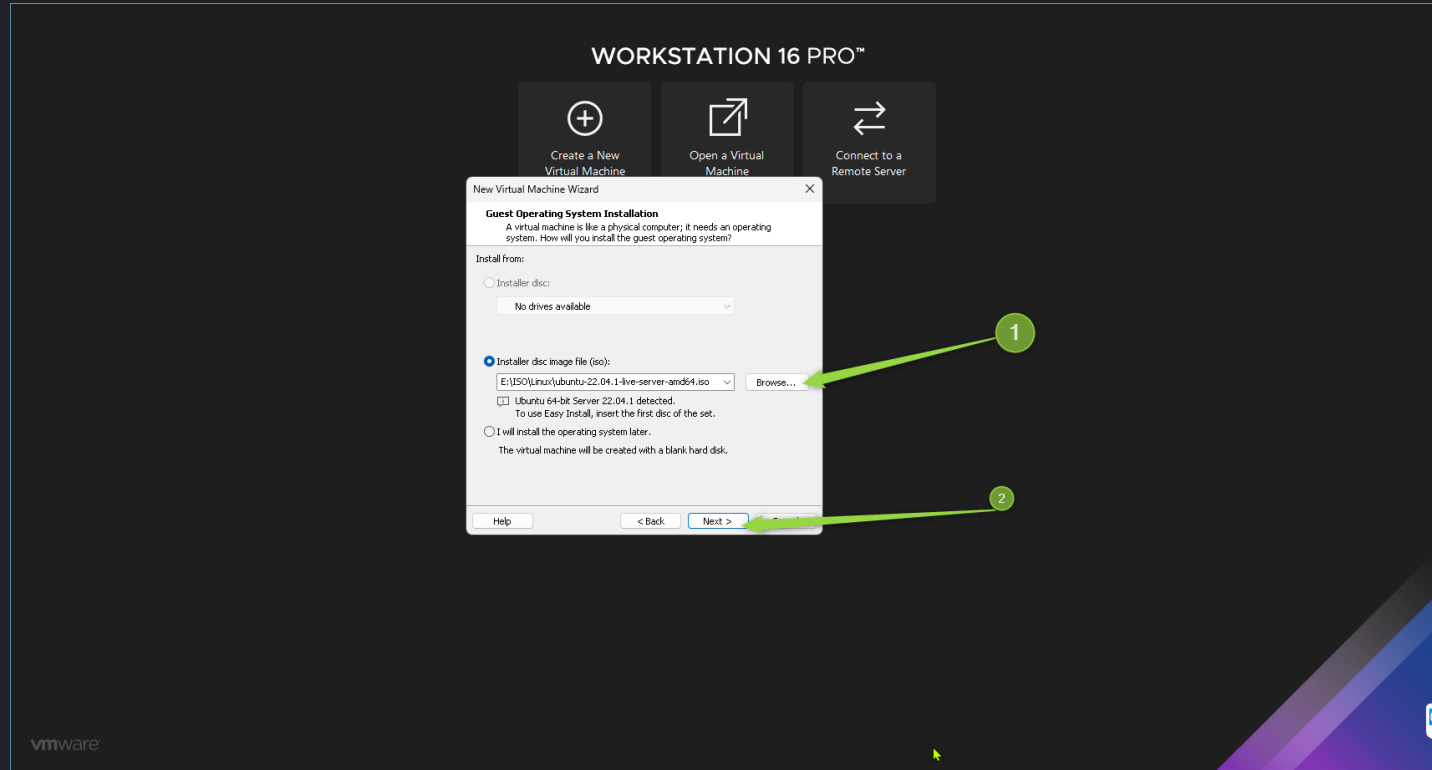
## 1. Select Create New Virtual Machine



## 2. Click On Next.

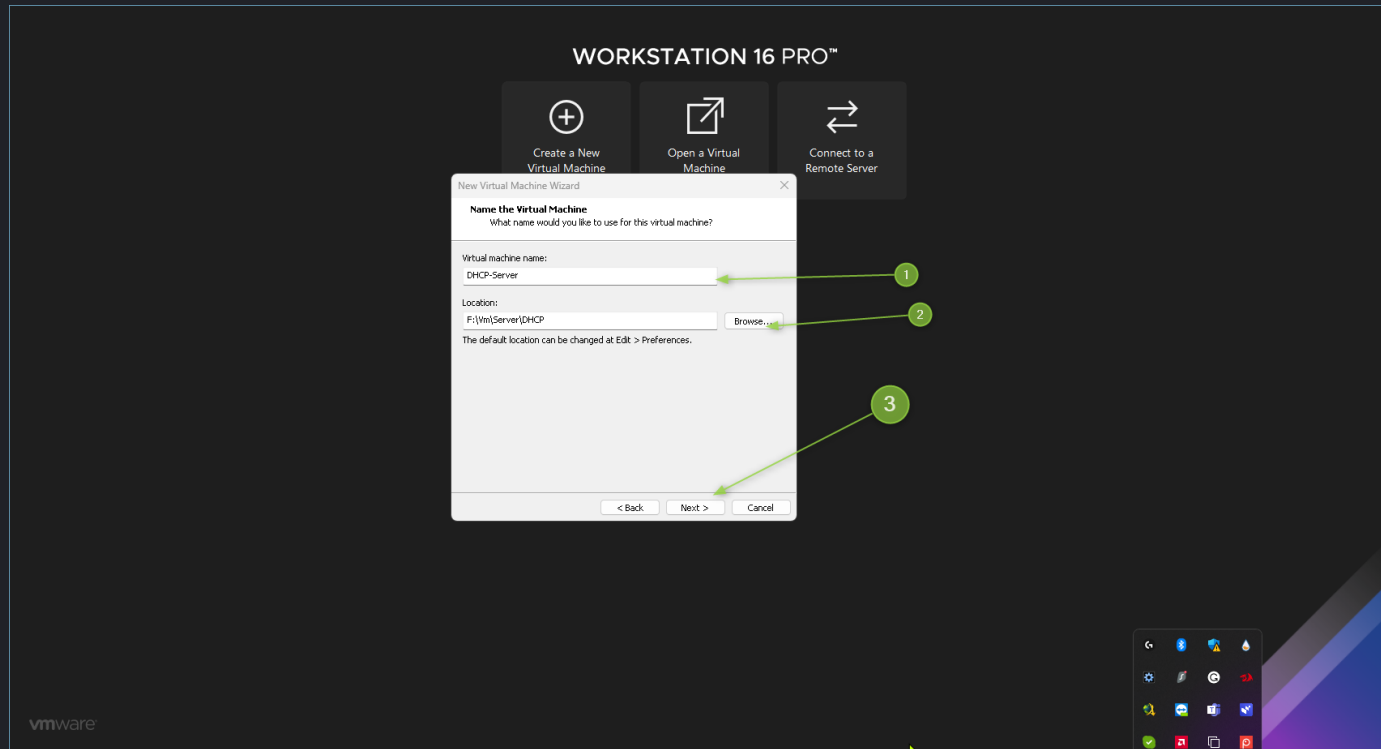


### 3. Selecting Image.



1. Browse Iso Image.
2. Click On Next.

# 4. Naming Server.

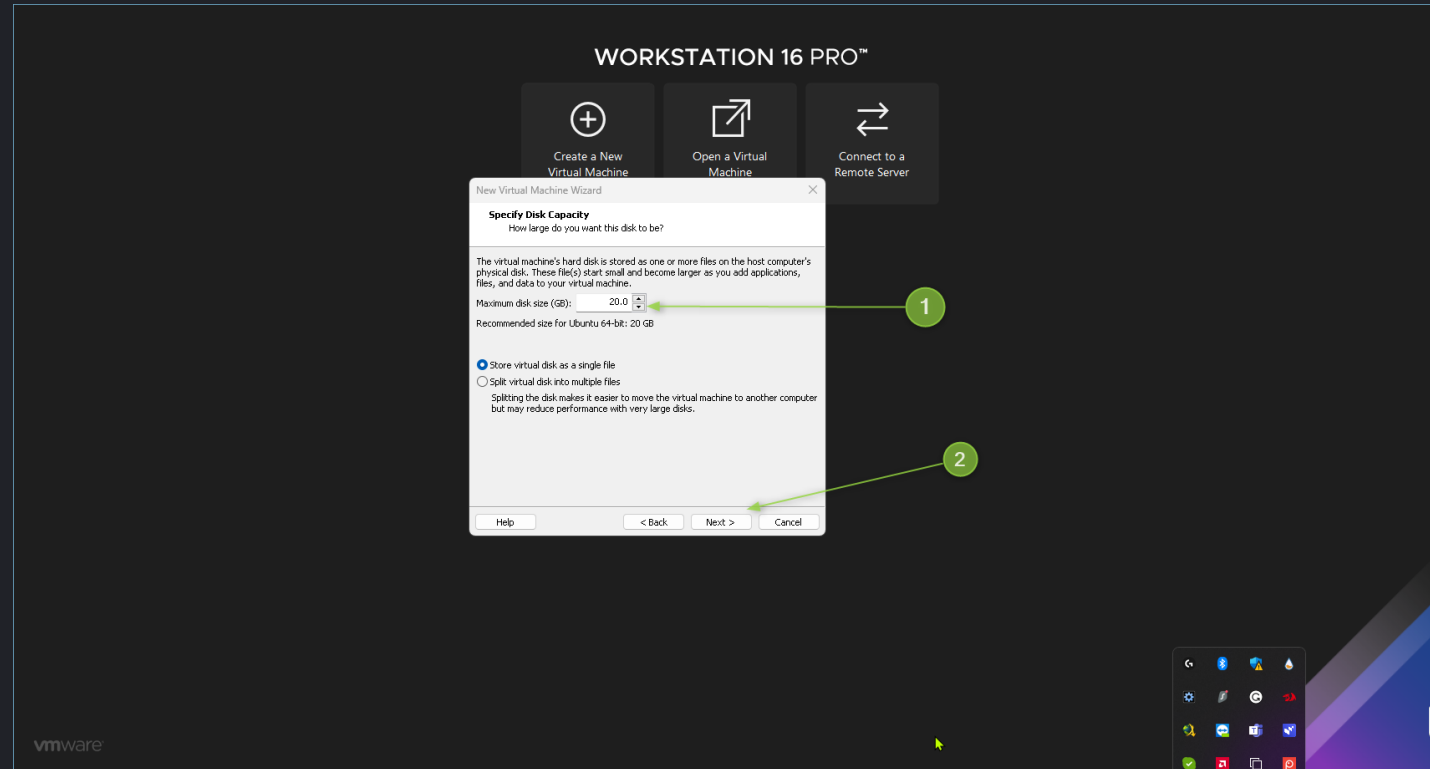


1. VM name.

2. VM location.

3. Click Next.

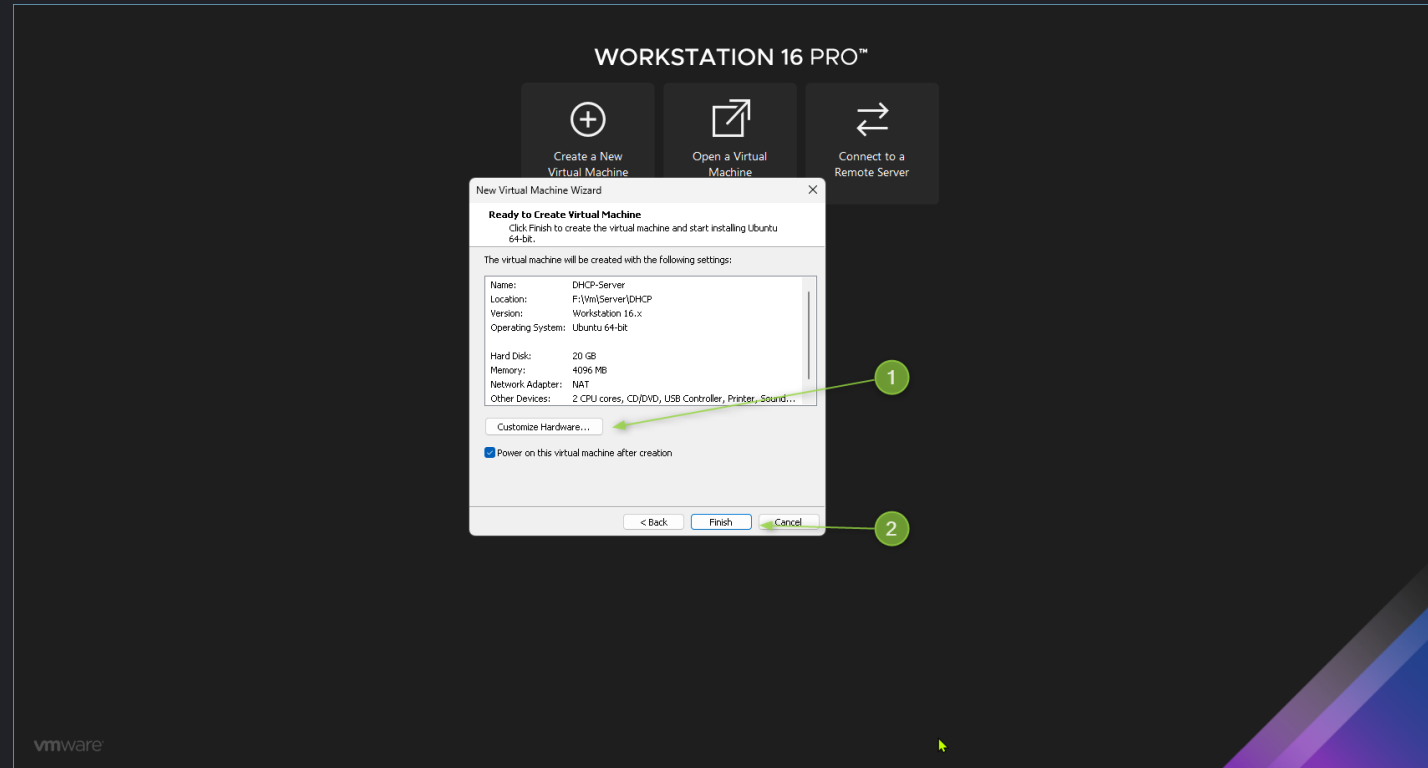
# 5. Storage Allocation.



1. Select Size.
2. Click Next.



# 6. Finish.



1. Customize Hardware(If Needed).
2. Click On Finish.

# Install DHCP Server

**You can install the DHCP Server using the apt command as follow**

```
sudo apt install isc-dhcp-server
```

# Backup Configuration File

Backup Original Configuration file It's always a good idea to backup original configuration files. In case if something goes wrong.

```
sudo cp /etc/dhcp/dhcpd.conf /etc/dhcp/dhcpd.conf.org
```

```
omerar@dhcp:~$ sudo cp /etc/dhcp/dhcpd.conf /etc/dhcp/dhcpd.conf.org
omerar@dhcp:~$ ls /etc/dhcp
ddns-keys  dhclient.conf      dhclient-exit-hooks.d  dhcpd.conf
debug      dhclient-enter-hooks.d  dhcpd6.conf            dhcpd.conf.org
omerar@dhcp:~$
```



# To Configure the DHCP Server

The main configuration file of DHCP server is  
`/etc/dhcp/dhcpd.conf`

```
sudo vim /etc/dhcp/dhcpd.conf
```

```
# which we don't really recommend.
#subnet 10.254.239.32 netmask 255.255.255.224 {
#  range dynamic-bootp 10.254.239.40 10.254.239.60;
#  option broadcast-address 10.254.239.31;
#  option routers rtr-239-32-1.example.org;
#}

## slightly different configuration for an internal subnet
subnet 192.168.100.0 netmask 255.255.255.0 {
  range 192.168.100.20 192.168.100.100;
  option domain-name-servers ns1.internal.example.org;
  option domain-name "internal.example.org";
  option subnet-mask 255.255.255.0;
  option routers 192.168.100.1;
  option broadcast-address 192.168.100.255;
  default-lease-time 600;
  max-lease-time 7200;
}

# Hosts which require special configuration options can be listed in
# host statements.  If no address is specified, the address will be
# allocated dynamically (if possible), but the host-specific information
# will still come from the host declaration.

#host passacaglia {
#  hardware ethernet 0:0:c0:5d:bd:95;
#  filename "vmunix.passacaglia";
#  server-name "toccata.example.com";
#}

# Fixed IP addresses can also be specified for hosts.  These addresses
# should not also be listed as being available for dynamic assignment.
# Hosts for which fixed IP addresses have been specified can boot using
# BOOTP or DHCP.  Hosts for which no fixed address is specified can only
# be booted with DHCP, unless there is an address range on the subnet
-- INSERT --
```

59,43

57%

# According To This Configuration


1. The default lease time for a client is 10 min(600 seconds)
2. The maximum lease time is 2 hrs(7200 seconds)
3. The Server will hand over the IP Address from the range 192.168.100.20 to 192.168.100.100

# Backing Up

Backup Original Configuration file It's always a good idea to backup original configuration files. In case if something goes wrong.

```
sudo cp /etc/default/isc-dhcp-server /etc/default/isc-dhcp-server.org
```

```
omerar@dhcp:~$ ls /etc/default/  
amd64-microcode  cryptdisks  grub.ucf-dist  keyboard  networkd-dispatcher  ssh  
appport          dbus        intel-microcode  locale    open-iscsi           ufw  
console-setup    grub        irqbalance      mdadm     pollinate            useradd  
cron             grub.d      isc-dhcp-server  motd-news  rsync  
omerar@dhcp:~$ sudo cp /etc/default/isc-dhcp-server /etc/default/isc-dhcp-server.org  
[sudo] password for omerar:  
omerar@dhcp:~$ ls /etc/default/  
amd64-microcode  cryptdisks  grub.ucf-dist  isc-dhcp-server.org  motd-news  rsync  
appport          dbus        intel-microcode  keyboard             networkd-dispatcher  ssh  
console-setup    grub        irqbalance      locale              open-iscsi           ufw  
cron             grub.d      isc-dhcp-server  mdadm               pollinate            useradd  
omerar@dhcp:~$
```



# Checking Interface Name For DHCP

```
ip a
```

```
omerar@dhcp:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:17:04:ee brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.100.7/24 metric 100 brd 192.168.100.255 scope global dynamic ens33
        valid_lft 40813sec preferred_lft 40813sec
    inet6 fe80::20c:29ff:fe17:4ee/64 scope link
        valid_lft forever preferred_lft forever
omerar@dhcp:~$ _
```

# Adding Interface Name For DHCP

```
sudo vim /etc/default/isc-dhcp-server
```

```
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPDv4_CONF=/etc/dhcp/dhcpd.conf
#DHCPDv6_CONF=/etc/dhcp/dhcpd6.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPDv4_PID=/var/run/dhcpd.pid
#DHCPDv6_PID=/var/run/dhcpd6.pid

# Additional options to start dhcpd with.
# Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
# Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="ens33"
INTERFACESv6=""

~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
```



# Configuring Firewall

```
omerar@dhcp:~$ sudo ufw status
Status: inactive
omerar@dhcp:~$ sudo ufw enable
Firewall is active and enabled on system startup
omerar@dhcp:~$ sudo ufw allow 67/udp
Rule added
Rule added (v6)
omerar@dhcp:~$ sudo ufw allow ssh
Skipping adding existing rule
Skipping adding existing rule (v6)
omerar@dhcp:~$ sudo ufw status
Status: active
```

To	Action	From
--	-----	----
22/tcp	ALLOW	Anywhere
67/udp	ALLOW	Anywhere
22/tcp (v6)	ALLOW	Anywhere (v6)
67/udp (v6)	ALLOW	Anywhere (v6)

```
omerar@dhcp:~$
```

```
sudo ufw status
sudo ufw enable
sudo ufw allow 67/udp
sudo ufw allow ssh
```

# Restart the DHCP Server

Now that changes to the configuration are made, we need to restart the service to enable those changes.

This can be done using the `systemctl` command:

```
sudo systemctl restart isc-dhcp-server
```

# Check the status of DHCP Services on DHCP Server

This can be done using the systemctl command:

```
sudo systemctl status isc-dhcp-server.service
```

An active status indicates that the DHCP Server has successfully picked up the configuration and is ready to hand out IP Addresses.

```
omerar@dhcp:~$ sudo systemctl restart isc-dhcp-server
omerar@dhcp:~$ sudo systemctl status isc-dhcp-server
• isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-02-01 19:53:03 UTC; 12s ago
     Docs: man:dhcpcd(8)
  Main PID: 3702 (dhcpcd)
    Tasks: 4 (limit: 4534)
   Memory: 4.5M
      CPU: 13ms
   CGroup: /system.slice/isc-dhcp-server.service
           └─3702 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/dhcpcd.pid -cf /etc/dh

Feb 01 19:53:03 dhcp sh[3702]: PID file: /run/dhcp-server/dhcpcd.pid
Feb 01 19:53:03 dhcp dhcpcd[3702]: Wrote 0 leases to leases file.
Feb 01 19:53:03 dhcp sh[3702]: Wrote 0 leases to leases file.
Feb 01 19:53:03 dhcp dhcpcd[3702]: Listening on LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp sh[3702]: Listening on LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp dhcpcd[3702]: Sending on   LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp sh[3702]: Sending on   LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp dhcpcd[3702]: Sending on   Socket/fallback/fallback-net
Feb 01 19:53:03 dhcp sh[3702]: Sending on   Socket/fallback/fallback-net
Feb 01 19:53:03 dhcp dhcpcd[3702]: Server starting service.
lines 1-21/21 (END)
```

# Check Lease List

This can be done using the Command:

```
sudo dhcp-lease-list
```

```
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/local/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
MAC                IP                hostname          valid until        manufacturer
=====
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/local/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
MAC                IP                hostname          valid until        manufacturer
=====
00:0c:29:a7:29:6c   192.168.100.21    Host2             2023-02-01 20:13:07 -NA-
```

# Check MAC address Of Host1

To Check MAC Address use this Command:

```
ip a
```

```
omerar@Host1:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:95:3b:a6 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.100.8/24 metric 100 brd 192.168.100.255 scope global dynamic ens33
        valid_lft 42982sec preferred_lft 42982sec
    inet6 fe80::20c:29ff:fe95:3ba6/64 scope link
        valid_lft forever preferred_lft forever
omerar@Host1:~$
```

# Configuring IP Reservation For Host1

```
sudo vim /etc/dhcp/dhcpd.conf
```

```
# Fixed IP addresses can also be specified for hosts.  These addresses
# should not also be listed as being available for dynamic assignment.
# Hosts for which fixed IP addresses have been specified can boot using
# BOOTP or DHCP.  Hosts for which no fixed address is specified can only
# be booted with DHCP, unless there is an address range on the subnet
# to which a BOOTP client is connected which has the dynamic-bootp flag
# set.
host Host1 {
    hardware ethernet 00:0C:29:95:3B:A6;
    fixed-address 193.168.100.22;
}
# You can declare a class of clients and then do address allocation
```

Now that we have the MAC Address, we can put it in the configuration file:

This will reserve the IP Address 192.168.100.22 for the client with the MAC Address 00:0C:29:95:3B:A6.

# Check Lease List

This can be done using the Command:

```
sudo dhcp-lease-list
```

```
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/local/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
```

MAC	IP	hostname	valid until	manufacturer
00:0c:29:95:3b:a6	192.168.100.22	Host1	2023-02-01 20:56:10	-NA-
00:0c:29:a7:29:6c	192.168.100.21	Host2	2023-02-01 20:56:01	-NA-

```
omerar@dhcp:~$ _
```



# Troubleshooting

The DHCP Server writes its logs to the Syslog. If you find that the status of the service is inactive, you should look into `/var/log/syslog` file. From there on you can search for the specific problem mentioned in the Syslog on the internet.

```
sudo less /var/log/syslog  
or  
sudo tail -f /var/log/syslog  
// for real time update on the log file
```

# Conclusion

In this article, we learned about DHCP and how to install a DHCP server on an Ubuntu machine. Having a DHCP Server automates the assignment of IP Addresses which is much better than the manual configuration of each client.